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Publication date:
2010

Document Version
Publisher's PDF, also known as Version of record

DTU Aqua
National Institute of Aquatic Resources

FISKERIVERKET

Fishery Dependent Information Conference 2010, Ireland

THE IMPACT OF MANAGEMENT REGULATIONS ON FISHERS' BEHAVIOUR: A CASE STUDY USING A SATELLITE-BASED VESSEL MONITORING SYSTEM

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The spatial distribution of a fishery is based on the fisher's perception of the spatial distribution of fish and the regulations governing the fishery. Regulations such as Total Allowable Catches (TAC's) and Minimum Landings Sizes (MLS's) alter what a fisher is allowed to land, therefore resulting in a redistribution of fishing effort among alternative fisheries or areas based on the fisher's perception of where/ what is the best possible catch. The extent to which a fisher is able to change location will depend on the fishers' ability to change target species and area, as well as the heterogeneity of the fishing grounds.

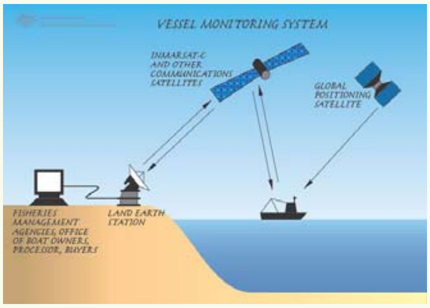

Fig. 1. Vessel Monitoring System (VMS). Taken from the Australian Fisheries Management website.

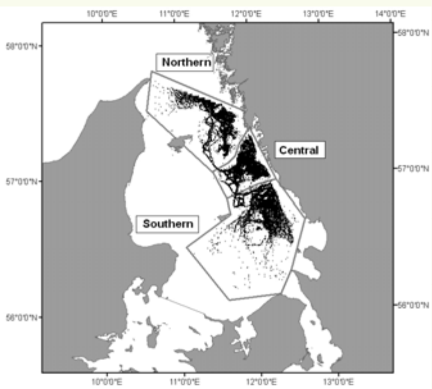

Fig. 2. Three main fishing grounds were identified in the Kattegat; Northern, Central, Southern. Points represent VMS signals for the periods analysed.

Fishers are an important component of a fishery and need to be incorporated into the construction of management policies and regulations. This study focuses on how catch controls impact on fishers' spatial displacement.

Methods:

We analysed landings and VMS data (Fig. 1) from the Swedish demersal fishing fleet active within the Kattegat during 2005-2007 and the ability of fishers to alter fishing grounds in relation to cod quotas being exhausted. To determine whether a shift in spatial distribution occurred, the spatial point patterns for the periods before and after quota exhaustion (Fig. 2) were analysed and compared using the difference in the *K*-function, $K(s) = \lambda^{-1} \cdot E[N_o(s)]$, between the two periods. Within the Swedish demersal fishery, the otter trawl fishery using >90mm mesh size has accounted for more than 90% of the total landings in the last five years.

Results:

Fishers seldom altered their location when the quota for the main target species, cod, was closed. Only during 2006 in the southern and central fishing grounds and in 2005 central fishing ground did the fleet alter their spatial dispersal (Fig. 4).

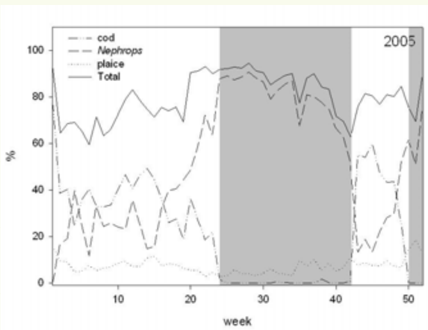

Fig. 3. Composition of the three most common species and their pooled total per week for 2005. Weeks 1-23, 43-49 cod fishery open (white). Weeks 24-42, 50-52 cod fishery closed (grey).

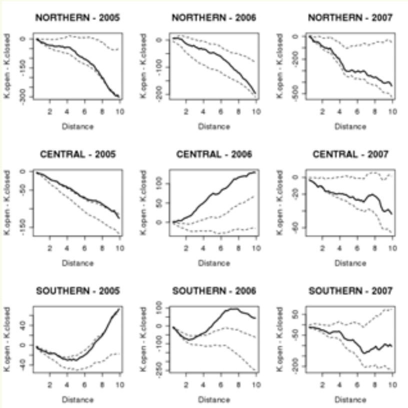

Fig.4. The difference between the K-function calculated on the points patterns from the open and closed periods (thick line) and the bootstrap 95% confidence interval (dotted line).

Conclusions:

The findings from this study show that the closure of quotas as a management tool within the Kattegat is rather ineffective. A species quota closure leads to a shift in documented landing compositions (Fig. 3), while seldom to a shift in spatial location. Fishing mortality is thus sustained and the regulation more than likely leads to an increase in discards, illegal landings, or both. Such behaviour is not the intention of the manager. The hypothesis that reduced TAC's lead to increased discarding or illegal fishing and not a change in fishing behaviour is thus supported.

Acknowledgements:

This study was undertaken at the Institute of Marine Research, Lysekil, Sweden.